Space Weather Forecast

Issued on Sunday, 02 October 2022 at 13:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of G1/Minor or G2/Moderate storms day 1 (2nd), then likely day 3 (4th). Moderate-class flares likely throughout. Slight chance of S1/Minor radiation storm during day 1 (2nd).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the last 24 hours, with two moderate-class flares from a sunspot in the northwest quadrant. This region has developed a north-south aligned magnetic structure, which may contribute to some magnetic instability. The large sunspot in the northeast continues to rotate into view on the northeast limb, is currently the largest but difficult to classify due to foreshortening. There are currently six numbered sunspots on the Earth-facing disc. The remaining regions appear largely stable with little change.

Three CMEs have been observed the northwest, these may pile-up and combine to give a glance at Earth around 04/0300 UTC.

Solar Wind / Geomagnetic Activity: Solar wind parameters have been indicative of an ongoing weak high speed stream, with a weak coronal mass ejection arrival around 01/1500 UTC. Wind speeds have been mostly slightly elevated. The total interplanetary magnetic field started weak, jumping to moderate when the coronal mass ejection was thought to arrive, before falling back to weak by 02/0500 UTC. The north-south component varied weakly. The resultant geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is currently just above normal background levels, below the S1/Minor Storm threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be Low to Moderate, with further Moderate-class flares likely from the large region in the northeast and the two regions in the northwest.

Solar Wind / Geomagnetic Activity: Three coronal mass ejections have erupted from the northwest quadrant in the past 24 hours. All three are expected to combine, giving a glancing impact at earth, with an expected arrival time around 04/0300 at Earth.

Solar winds are currently slightly elevated, with a chance of rising to elevated should a late coronal hole fast wind arrive during day 1 (2nd). Solar winds should then ease during day 2 (3rd) back to slightly elevated or background levels before the combined coronal mass ejections bring possible elevated solar wind speeds during day 3 (4th). Solar winds should then fall back to background levels through day 4 (5th).

Geomagnetic activity will be Quiet to Unsettled (Kp 0-3) initially, with a chance of becoming Active G1/Minor storm (Kp 4-5), and a slight chance of a G2/Moderate storm interval (Kp 6) day 1. Geomagnetic activity should ease into day 2 (3rd), before the arrival of the three coronal mass ejections either late day 2 (3rd) or more likely early day 3 (4th), with G1/G2 Minor/Moderate storming (Kp 5-6) considered likely. Geomagnetic activity should ease once again into day 4

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

(5th) back to Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles is currently above background after the Moderate flare on 1st October from the northwest. There is a slight chance proton levels will breach the S1/Minor Storm threshold during Day 1 (02 Oct), with a gradual decrease likely thereafter in the absence of further large flares from the western hemisphere.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	20	60	10
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	15	15	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.